

LA-UR- 04-0567


Approved for public release;
distribution is unlimited.

Title: Closing the TSTA Facility, Tritium Removed From TSTA

Author(s): Chuch Tesch, Michael Rogers, Roy Michellitti, Richard Carlson

Submitted to: 7th International Conference on Science and Technology



Los Alamos National Laboratory, an affirmative action/equal opportunity employer, is operated by the University of California for the U.S. Department of Energy under contract W-7405-ENG-36. By acceptance of this article, the publisher hizes that the U.S. Government retains a nonexclusive, royalty-free license to publish or reproduce the published form of this contribution, or to allow others to do so, for U.S. Government purposes. Los Alamos National Laboratory requests that the publisher identify this article as work performed under the auspices of the U.S. Department of Energy. Los Alamos National Laboratory strongly supports academic freedom and a researcher's right to publish; as an institution, however, the Laboratory does not endorse the viewpoint of a publication or guarantee its technical correctness.

Form 836 (8/00)

The Tritium Systems Test Assembly (TSTA) project was begun in 1978 to develop, design, and demonstrate the technology and safe operation of selected tritium processing systems required for a fusion reactor. The TSTA is located at Los Alamos National Laboratory in Los Alamos, New Mexico, and was initially funded by the US DOE. Tritium processing at TSTA began in 1984. In 2001, DOE determined that the mission of TSTA had been successfully completed, and the facility should be stabilized. Stabilization comprised placing the facility in a safe and stable configuration with a goal of reducing the tritium inventory to below the DOE low-hazard nuclear facility threshold of 16000 Ci. The facility was then to be held in this safe and stable state until funding was available for the final decontamination and decommissioning. This paper will describe the process and results of the activities required to achieve the safe and stable condition.

At the completion of the TSTA mission, the tritium inventory at TSTA was 170 grams. The facility was categorized as a DOE moderate-hazard nuclear facility. At the completion of the stabilization project in 2003, the tritium inventory had been reduced to less than 1 gram, well below the low-hazard nuclear facility threshold, and the facility was categorized as a radiological facility. The pre-stabilization tritium inventory at TSTA was grouped in the following categories: tritium gas mixed with hydrogen isotopes, tritiated water absorbed on molecular sieve, tritium held up as a hydride on various metals, and tritium held up in process components. For each category, the tritium content was characterized, a path for removal was determined, and the proper disposal package was developed. Half of the tritium removed from the facility was reusable and the other half was disposed as waste. Hydrogen exchange, calorimetry, direct sampling, pressure/composition/temperature, radiological smear surveys, and controlled regeneration were methods used to determine the tritium inventory.

The removed tritium inventory was either sent to other facilities for processing or buried at the Los Alamos radioactive waste disposal site. No effort was made to recover tritiated water absorbed on molecular sieve. Some hardware was sent to other facilities for reuse. One complete experimental system, including a contaminated glovebox and many components, was packaged and transferred to another DOE site for future use. Special burial containers that could safely contain up to 10 grams of tritium per package were designed and fabricated. The entire project was conducted with low tritium emission to the environment and negligible personnel exposure. After completion of the tritium removal, all remaining hardware and piping were opened and vented, and facility emission was below 1 Ci per day.